

REMARKS

Claims 1-23 were examined and reported in the Office Action. Claims 1, 2, 8, 14 and 15 are rejected. Claims 1, 3, 9, 14 and 16-17 are amended. Claims 1-23 remain.

Applicant requests reconsideration of the application in view of the following remarks.

I. 35 U.S.C. § 103

A. It is asserted in the Office Action that claims 1, 2, and 8 are rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over U. S. Patent 6,599,821 issued to Lee ("Lee") in view of U. S. Patent 6,455,383 issued to Wu ("Wu") and U. S. Patent 5,308,655 issued to Eichman et al ("Eichman"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

According to MPEP §2142

[t]o establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. (In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Applicant's amended claim 1 contains the limitations of

[a] method for fabricating a semiconductor device, comprising: forming a stack layer of a gate layer, a poly-silicon layer, a tungsten layer, and a hard mask sequentially deposited on a semiconductor substrate; carrying out a selective oxidation process adopting a rapid thermal process (RTP), wherein the poly-silicon layer of the stack layer is only oxidized; performing a heat treatment process by slowly increasing a temperature of a LPCVD furnace from a room temperature to a target temperature for the heat treatment process and keeping the target temperature in a vacuum ambient;

decreasing the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer; and carrying out a process for forming the gate sealing nitride layer on the heat treated stack layer.

Lee discloses a method for fabricating a conductive line pattern that uses a heat treatment process for releasing a stress caused by a RTP. In Lee, the RTP is performed in a predetermined gas ambient for forming an oxide or a nitride film. In Applicant's claimed invention, however, a heat treatment process is performed by slowly increasing a temperature of a LPCVD furnace from room temperature to a target temperature for the heat treatment process and keeps the target temperature in a vacuum ambient.. Further, Applicant's claimed invention decreases the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer. Lee, however, does not teach, disclose or suggest "performing a heat treatment process by slowly increasing a temperature of a LPCVD furnace from a room temperature to a target temperature for the heat treatment process and keeping the target temperature in a vacuum ambient; decreasing the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer."

Wu discloses methods of fabricating scaled MOSFETS. Wu, however, does not disclose, teach or suggest a heat treatment process for releasing a stress caused by a RTP. In Wu, the heat treatment, e.g., LPCVD, is performed in a predetermined gas ambient for forming an oxide or a nitride film. Wu does not teach, disclose or suggest "performing a heat treatment process by slowly increasing a temperature of a LPCVD furnace from a room temperature to a target temperature for the heat treatment process and keeping the target temperature in a vacuum ambient; decreasing the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer."

Eichman discloses a method for forming low resistivity TiN film using TiCl_4 and NH_3 gases by LPCVD under in-situ or under ex-situ. That is, Eichman is concerned with the point that after the TiCl_4 gas flows into the LPCVD chamber, the NH_3 gas flows into the LPCVD chamber for stripping off the remaining unbound chlorine within the TiN film, which may be

performed in the same LPCVD chamber or in the other LPCVD chamber. In Eichman, the heat treatment, e.g., LPCVD, is performed in a predetermined gas ambient for forming an oxide or a nitride film. Eichman, however, does not teach, disclose or suggest “performing a heat treatment process by slowly increasing a temperature of a LPCVD furnace from a room temperature to a target temperature for the heat treatment process and keeping the target temperature in a vacuum ambient; decreasing the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer.”

Since neither Lee, Wu, Eichman, and therefore, nor the combination of the three teach, disclose or suggest all the limitations of Applicant's amended claim 1, as listed above, Applicant's amended claim 1 is not obvious over Lee in view of Wu, and further in view of Eichman since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claims that directly or indirectly depend from amended claim 1, namely claims 2 and 8, would also not be obvious over Lee in view of Wu and further in view of Eichman for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claims 1, 2, and 8 are respectfully requested.

B. It is asserted in the Office Action that claims 14 and 15 are rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Wu in view of Eichman. Applicant respectfully traverses the aforementioned rejection for the following reasons.

Wu and Eichman are addressed above in section I(A) regarding Applicant's amended claim 1. Similar to amended claim 1, Applicant's claim 14 contains the limitations of

performing a heat treatment process by slowly increasing a temperature of another LPCVD furnace or an annealing furnace from a room temperature to a target temperature for the heat treatment process and maintaining the target temperature in a vacuum or inert gas ambient of an LPCVD furnace or an annealing furnace for releasing a stress exerted during the selective oxidation process and gate sealing nitride layer deposition process; decreasing the temperature of the LPCVD furnace from the target temperature for the heat treatment to a room temperature; and

performing a rapid thermal process (RTP) for activating source/drain regions of the semiconductor device.

In either Eichman or Wu, the heat treatment, e.g., LPCVD, or RTP is performed in a predetermined gas ambient for forming an oxide or a nitride film. In Applicant's claimed invention, however, a heat treatment process is performed by slowly increasing a temperature of a LPCVD furnace from room temperature to a target temperature for the heat treatment process and keeps the target temperature in a vacuum ambient.. Further, Applicant's claimed invention decreases the temperature of the LPCVD furnace from the target temperature for the heat treatment process to a target temperature for depositing a gate sealing nitride layer, which is not taught, disclosed or suggested by either Wu, Eichman, nor the combination of the two.

Since neither Wu, Eichman, and therefore, nor the combination of the two teach, disclose or suggest all the limitations of Applicant's amended claim 14, as listed above, Applicant's amended claim 14 is not obvious over Wu in view of Eichman since a *prima facie* case of obviousness has not been met under MPEP §2142. Additionally, the claim that directly depends from amended claim 14, namely claim 15, would also not be obvious over Wu in view of Eichman for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claims 14 and 15 are respectfully requested.

II. Allowable Subject Matter

Applicant notes with appreciation the Examiner's assertion that claims 3-7, 9-13 and 16-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant respectfully asserts that claims 1-23, as they now stand, are allowable for the reasons given above.

CONCLUSION

In view of the foregoing, it is submitted that claims 1-23 patentably define the subject invention over the cited references of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes a telephone conference would be useful in moving the case forward, he is encouraged to contact the undersigned at (310) 207-3800.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail with sufficient postage in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia 22313-1450 on March 10, 2006.


Jean Svoboda